

NASA TECH BRIEF

NASA Pasadena Office



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Soldering Iron Temperature Indicator

The problem:

Specifications for soldering procedures for spacecraft components usually require that the joint being soldered be brought to a certain temperature [such as 625°F (330°C)] for a period of a few seconds (usually two). Strict compliance with such requirements is necessary in order to obtain the high degree of reliability needed for work in space. Unfortunately, commercially available temperature-controlled soldering irons are not capable of holding a nominal temperature over a period of several hours during the course of an assembly operation. Thus, it was considered necessary to measure actual tip temperatures at any time during soldering operations.

The solution:

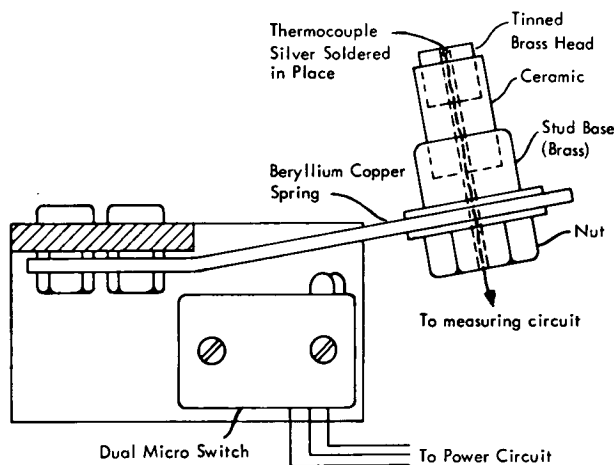
A thermocouple implanted in a metal mass is used to simulate the heat transfer characteristics of the connection which is to be soldered; light signals indicate whether the temperature is right, too low, or too high.

How it's done:

A Chromel-Alumel thermocouple is silver-soldered into a brass receptacle of a mass which has a heat transfer characteristic equivalent to a typical connection that is soldered in the course of assembly. The brass is tinned and then mounted on a ceramic insulator which in turn is cemented to a threaded stud, as indicated in the diagram. The stud is fastened to a leaf spring which operates microswitches when the leaf is depressed by the tip of the soldering iron.

Considerable care must be exercised in the fabrication of the thermocouple brass head, for it is desired that the head simulate the actual soldering

conditions as much as possible; the temper of the leaf spring is also carefully adjusted so that the pressure which is applied to operate the microswitches is very similar to the pressure applied in a normal



soldering operation. Thus, when the tip of the soldering iron is touched to the brass thermocouple head and pressed down, the microswitches activate measuring circuits and the temperature of the soldered "joint" is indicated.

Temperature is indicated by white, green, amber, and red light bulbs. If the white bulb lights, the temperature is 25°F (about 14°C) below the desired temperature. The proper temperature is indicated by a green light; the amber light means the temperature is too high by 25°F, and the red light that it is 50° too high.

The electronic circuits for operating the bulbs use integrated-circuit operational amplifiers to compare

(continued overleaf)

selected reference voltages with the thermocouple output. Other elements of the circuits ensure that only one bulb is lit at any time.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP72-10098

Patent status:

No patent action is contemplated by NASA.

Source: Charles D. Baker and
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Caltech/JPL
under contract to
NASA Pasadena Office
(NPO-11545)